Spot Safety Project Evaluation

Project Log # 200702001

Spot Safety Project # 10-01-201

Spot Safety Project Evaluation of the Traffic Signal Revision and Turn Lane Installation at US 29 and SR 1305 (Pitts School Rd) in Cabarrus County

Documents Prepared By:

Safety Evaluation Group
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3/12/2008
Date

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 10-01-201 – Traffic Signal Revision and Turn Lane Installation at US 29 and SR 1305 (Pitts School Rd) in Cabarrus County.

Project Information and Background from the Project File Folder

US 29 is a four lane divided roadway with left turn lanes at Pitts School Rd. Pitts School Rd is currently a two lane roadway with left turn lanes at US 29. US 29 has a speed limit of 55 mph and Pitts School has a speed limit of 45 mph. The intersection is controlled by a full phase traffic signal.

The original problem statement shows a City of Concord project to widen Pitts School Rd and improve the intersection for increased capacity. There was a high school that would be opening in the fall of 2001 and would generate a considerable amount of traffic. The previous crash study from 8/1/1997 to 8/1/2000 yielded 25 total crashes. The improvements chosen for the intersection was to add left turn lanes on Pitts School Rd and a protected/permitted left turn phase for both approaches. The final completion date for the improvement at the subject location was on February 2, 2002 at a cost of $45,000 with $565,000 from the City of Concord.

Naive Before and After Analysis

After reviewing the spot safety project file folder along with all the crashes along the subject road, the crash data omitted from this analysis to consider for an adequate construction period was from January 1, 2002 through March 31, 2002. The before period consisted of reported crashes from June 1, 1997 through December 31, 2001 (4 years, 7 months) and the after period consisted of reported crashes from April 1, 2002 through October 31, 2006 (4 years, 7 months). The ending date for this analysis was determined by the available crash data at the time the crash analysis was completed.

The treatment data consisted of all crashes within 150 feet of the subject intersection. The following data table depicts the Naive Before and After Analysis for the above information. Please note that Frontal Impact crash types influenced by the implemented countermeasure were the target crashes for the treatment location. These crash types considered are as follows: Left Turn, same roadway; Left Turn, different roadway; Right Turn, same roadway; Right Turn, different roadway; Head On, and Angle.

Treatment Information

	Before	After	Percent Reduction (-) Percent Increase (+)
Total Crashes	70	77	10.0
Total Severity Index	5.5	3.6	-34.5
Frontal Impact Crashes	20	14	-30.0
Frontal Severity Index	10.4	5.2	-49.9
Volume	30050	37800	25.8

Treatment Injury Crashes

	Before	After	Percent Reduction (-) Percent Increase (+)
Fatal	0	0	N/A
Class A	2	0	-100.0
Class B	5	5	0.0
Class C	17	22	29.4
Property Damage Only	46	50	8.7

Frontal Injury Crashes

	Before	After	Percent Reduction (-) Percent Increase (+)
Fatal	0	0	N/A
Class A	2	0	-100.0
Class B	3	3	0.0
Class C	2	5	150.0
Property Damage Only	13	6	-53.8

Table 1.

The naive before and after analysis at the treatment location resulted in a 10 percent increase in Total Crashes, a 30 percent decrease in Frontal Impact Crashes, and a 26 percent increase in Average Daily Traffic (ADT). The before period ADT year was 1999 and the after period ADT year was 2004.

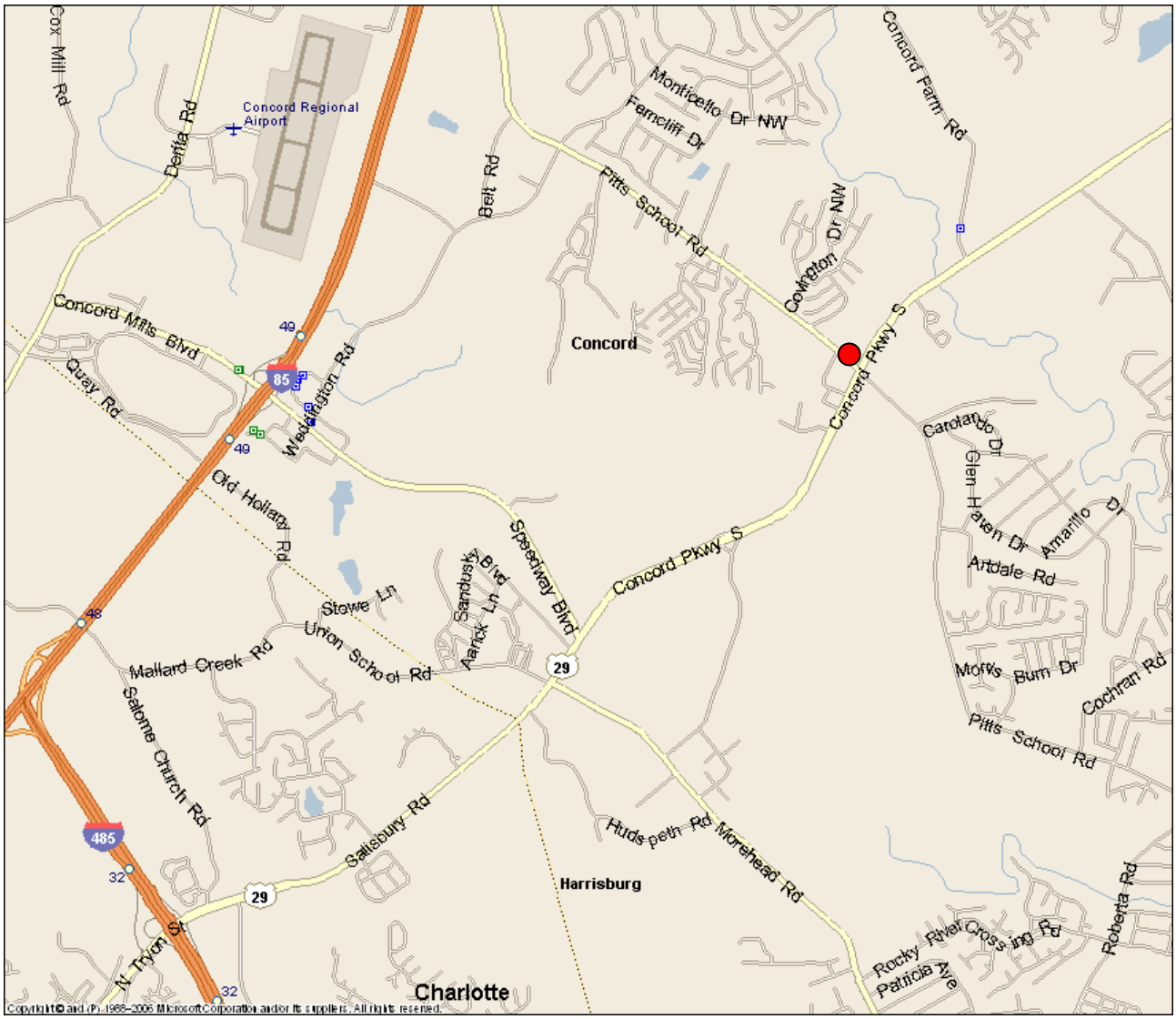
Results and Discussion

The naïve before and after analysis involving the comparison of treatment actual before data versus treatment actual after data resulted in a 10 percent increase in Total Crashes and a 30 percent decrease in Frontal Impact Crashes. The summary results above demonstrate that the treatment location appears to have had an increase in the number of Total Crashes and a decrease in the number of Frontal Impact Crashes from the before to the after period.

Referencing Table 1 this location has not experienced a reduction in total crashes from the before to the after period. There has been a reduction in severity for both total and frontal impact crashes. There was an increase of rear end crashes from the before (25) to the after (34) period. While this location did experience a reduction in critical areas, such as severity and frontal impact crashes, there may need to be further improvements made in order to safely move vehicles through this congested area.

The calculated benefit to cost ratio for this project is 20.28 considering total crashes. The benefit to cost ratio considering only target crashes is 22.07. The benefits are calculated using the change in annual crash costs from the before to the after period. Operational and other benefits related to the project are not considered in this analysis. The costs of the project include the actual construction costs as well as the increase in annual maintenance and utility costs.

As the Safety Evaluation Group completes additional spot safety reviews for this type of countermeasure, we will be able to provide objective and definite information regarding actual crash reduction factors for this type of road.



Location Map: US 29 at SR 1305 (Pitts School Rd) in Cabarrus County

TREATMENT BENEFIT-COST ANALYSIS WORKSHEET

LOCATION: US 29 at SR 1305 BY: SDC
COUNTY: Cabarrus DATE: 2/22/2007
FILE NO.: SS 10-01-201

DETAILED COST: TYPE IMPROVEMENT - Signal and Left Turn Lane

ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST
Construction	$45,000	10	0.149	$6,706
	$0	0	0.000	$0
Right-of-Way	$0	0	0.000	$0
TOTALS	$45,000	10	0.149	$6,706

ESTIMATED INCREASE IN ANNUAL MAINT. COST = $2,000
ESTIMATED INCREASE IN ANNUAL UTILITY COST = $900

TOTAL ANNUAL COST= $9,606
TOTAL COST OF PROJECT= $45,000

COMPREHENSIVE COST REDUCTION:

ESTIMATED NUMBER OF ANNUAL ACCIDENT DECREASES

TIME PERIOD	YEARS	K & A CRASHES	K & A CRASHES PER YR	B & C CRASHES	B & C CRASHES PER YR	PDO CRASHES	PDO CRASHES PER YR	ANNUAL COSTS
BEFORE	4.59	2	0.44	22	4.79	46	10.02	$343,224
AFTER	4.59	0	0.00	27	5.88	50	10.89	$148,366

Annual Benefits from Crash Cost Savings $194,858

NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST = $185,252

BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST = 20.28

TOTAL COST OF PROJECT - $45,000 COMPREHENSIVE B/C RATIO - 20.28

TARGET BENEFIT-COST ANALYSIS WORKSHEET

LOCATION: US 29 at SR 1305 BY: SDC
COUNTY: Cabarrus DATE: 2/22/2007
FILE NO.: SS 10-01-201

DETAILED COST: TYPE IMPROVEMENT - Signal and Left Turn Lane

ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST
Construction	$45,000	10	0.149	$6,706
	$0	0	0.000	$0
Right-of-Way	$0	0	0.000	$0
TOTALS	$45,000	10	0.149	$6,706

ESTIMATED INCREASE IN ANNUAL MAINT. COST = $2,000
ESTIMATED INCREASE IN ANNUAL UTILITY COST = $900

TOTAL ANNUAL COST= $9,606
TOTAL COST OF PROJECT= $45,000

COMPREHENSIVE COST REDUCTION:

ESTIMATED NUMBER OF ANNUAL ACCIDENT DECREASES

TIME PERIOD	YEARS	K & A CRASHES	K & A CRASHES PER YR	B & C CRASHES	B & C CRASHES PER YR	PDO CRASHES	PDO CRASHES PER YR	ANNUAL COSTS
BEFORE	4.59	2	0.44	5	1.09	13	2.83	$248,519
AFTER	4.59	0	0.00	8	1.74	6	1.31	$36,471

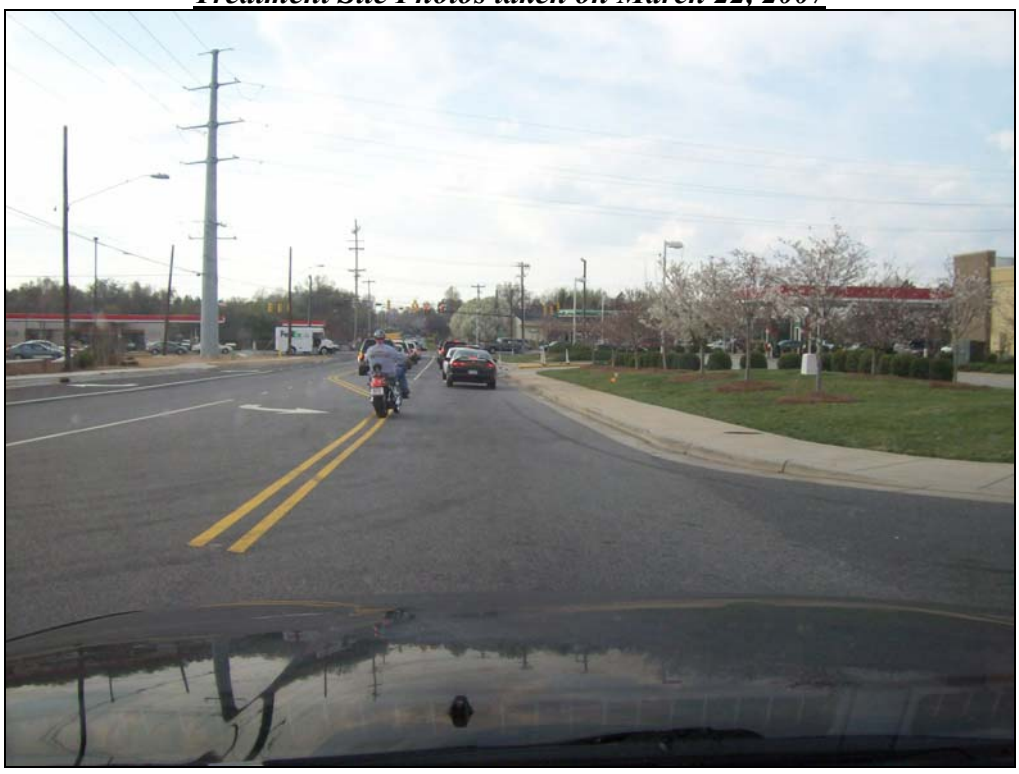
Annual Benefits from Crash Cost Savings $212,048

NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST = $202,442

BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST = 22.07

TOTAL COST OF PROJECT - $45,000 COMPREHENSIVE B/C RATIO - 22.07

Treatment Site Photos taken on March 22, 2007

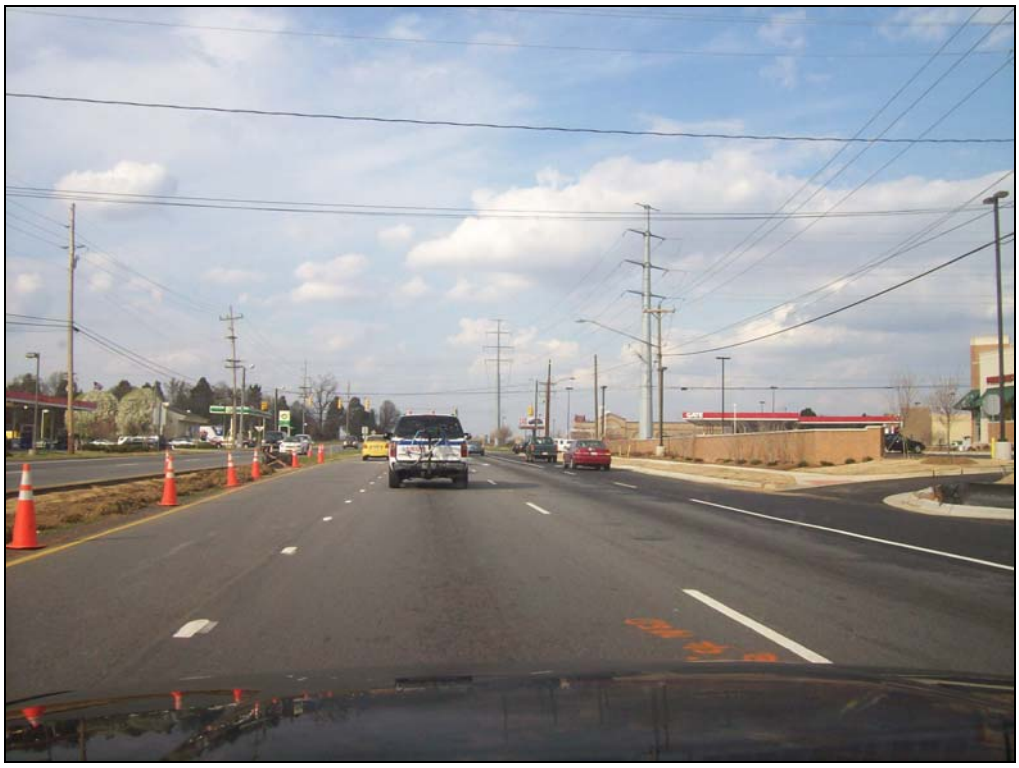


Driving west on Pitts School Rd

Driving west on Pitts School Rd

Driving east on Pitts School Rd

Driving east on Pitts School Rd

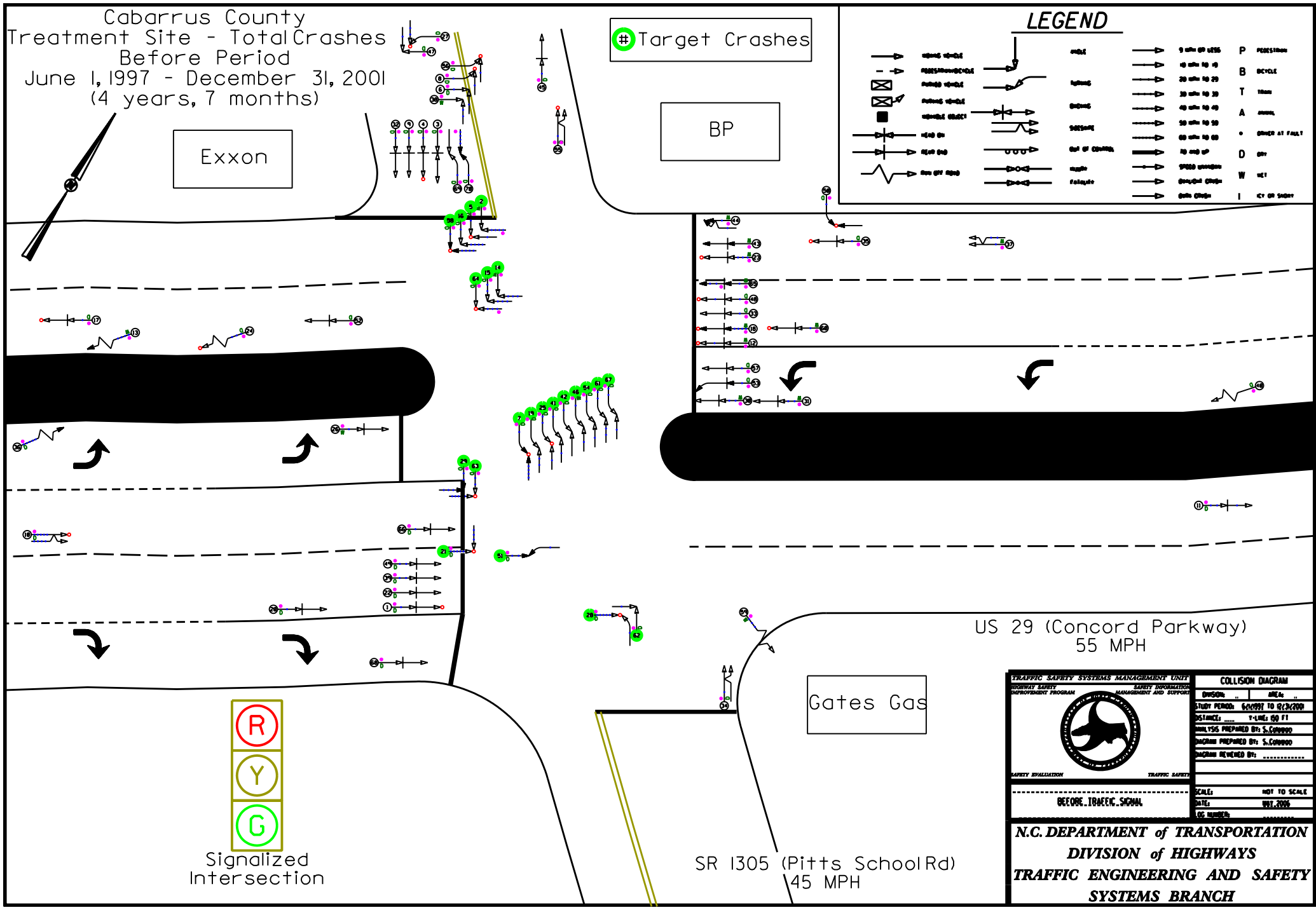


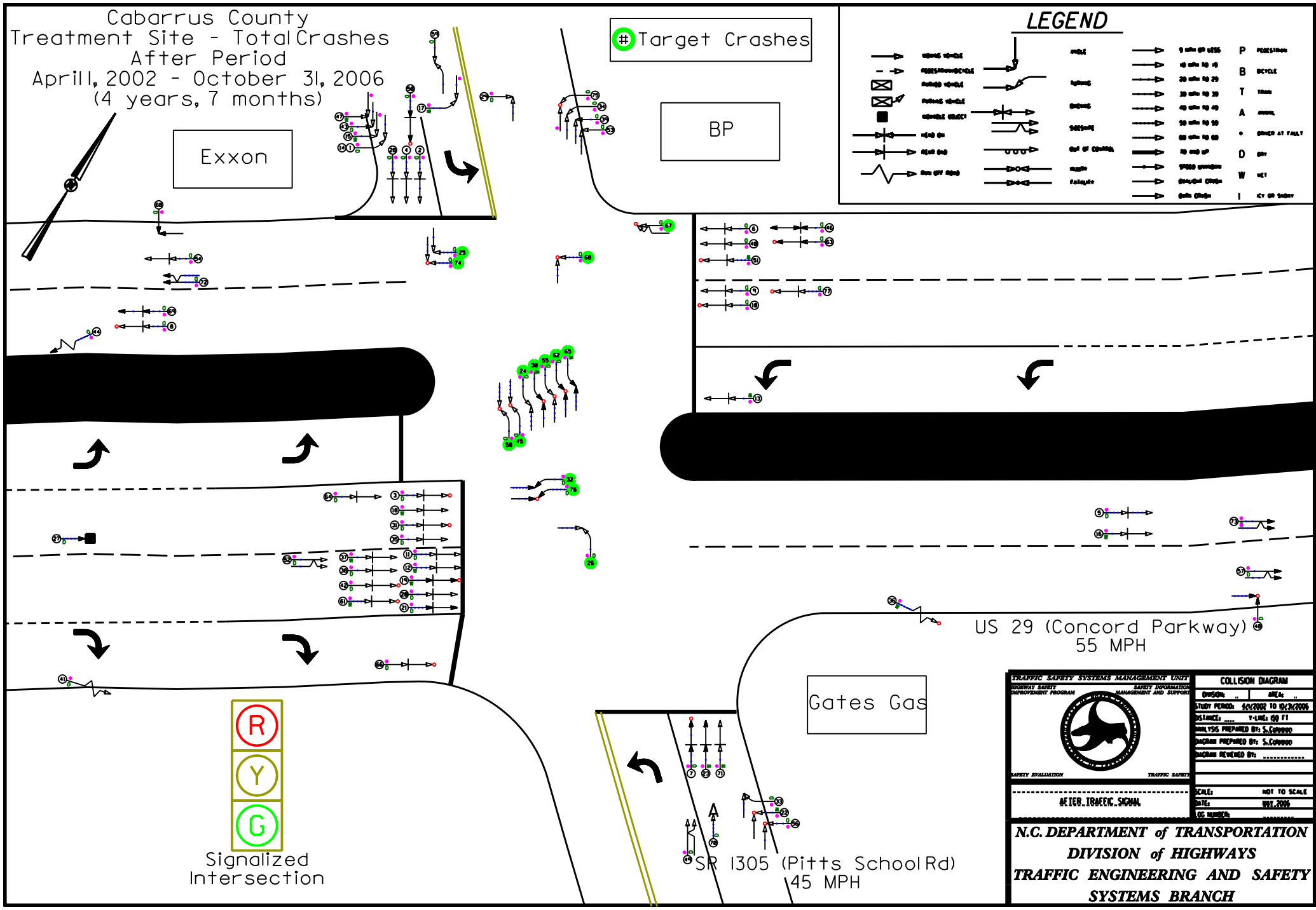
Driving north on US 29

Driving north on US 29

Driving south on US 29

Driving south on US 29


Cabarrus County
Treatment Site - Total Crashes
Before Period
June 1, 1997 - December 31, 2001
(4 years, 7 months)
Exxon
BP
Target Crashes
LEGEND
US 29 (Concord Parkway)
55 MPH
Gates Gas
R
Y
G
Signalized
Intersection
SR 1305 (Pitts School Rd)
45 MPH
TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT
HIGHWAY SAFETY IMPROVEMENT PROGRAM
SAFETY INFORMATION MANAGEMENT AND SUPPORT
SAFETY EVALUATION
TRAFFIC SAFETY
COLLISION DIAGRAM
BEFORE TRAFFIC SIGNAL
N.C. DEPARTMENT of TRANSPORTATION
DIVISION of HIGHWAYS
TRAFFIC ENGINEERING AND SAFETY
SYSTEMS BRANCH


Cabarrus County
Treatment Site - Total Crashes
After Period
April 1, 2002 - October 31, 2006
(4 years, 7 months)
Target Crashes
LEGEND
Exxon
BP
Gates Gas
US 29 (Concord Parkway)
55 MPH
SR 1305 (Pitts School Rd)
45 MPH
Signalized
Intersection
R
Y
G
TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT
COLLISION DIAGRAM
AETER_TRAFFIC_SIGNAL
N.C. DEPARTMENT of TRANSPORTATION
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SYSTEMS BRANCH